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DECAYING ARMY INFRASTRUCTURE: AN UNEXPECTED  
OPPORTUNITY FOR REVERSAL

BY

MR. HAROLD W. MORGAN

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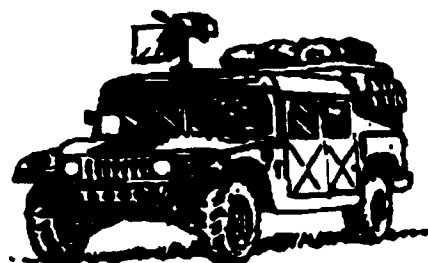
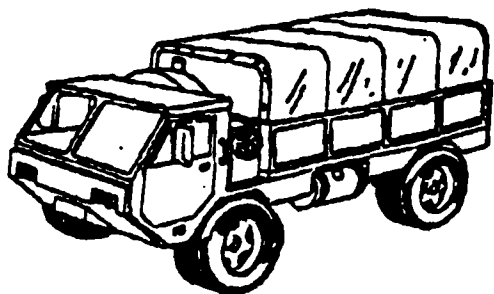
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*... to ... Had no investigation; ...*

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### DECAYING ARMY INFRASTRUCTURE: AN UNEXPECTED OPPORTUNITY FOR REVERSAL

#### AN INDIVIDUAL STUDY PROJECT

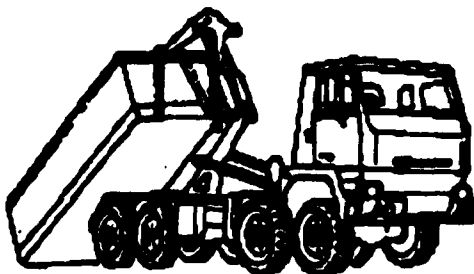
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# ABSTRACT

AUTHOR: Harold W. Morgan, CPL

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The U.S. Army over time has grown to depend more and more upon the lowly truck as essential to the conduct of modern warfare. Trucks are now so pervasive throughout the Army that they constitute the infrastructure upon which it operates. The requirement has, however, grown to the point where modernization of the entire truck fleet has been deemed unaffordable, given the costs for competing programs of higher priority. The Tactical Wheeled Vehicle Modernization Plan (TWVMP) of 1989 struggled with this dilemma and failed to resolve it. With the world undergoing peaceful change at an incredible speed, an unexpected opportunity now exists to fully modernize the decaying truck fleet. The TWVMP no longer reflects the needs of the Army. This paper explores a hypothetically lower U.S. Army force structure, its relationship to the size of the truck fleet and identifies alternatives for change. These alternatives are evaluated and conclusions drawn that can form the basis for a revision to the TWVMP. A timely Army effort to use these conclusions to frame a 1990 TWVMP revision will result in a mid to long term truck fleet which better meets the capability needs of the Army and reduces the overall bill to the taxpayer.



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DECAYING ARMY INFRASTRUCTURE: AN UNEXPECTED  
OPPORTUNITY FOR REVERSAL

CHAPTER I

INTRODUCTION

An anonymous contractor commenting on the U.S. Army's view of trucks once said:

Trucks are like socks -- you never think much about them until you look for them in the morning and can't find them.

This rather prophetically described the Army's corporate view of trucks. Almost unnoticed, however, trucks have become the infrastructure upon which every U.S. Army unit depends. Truck usage has increased to provide the mobility of weapon systems, communication systems, unit mobility, and logistics support necessary to execute Airland Battle Doctrine.

This progressive dependency has not translated into the requisite priority and subsequent funding levels necessary to modernize the fleet -- the sock analogy is valid today. Ironically this dependency, and its resultant requirements growth (+22% from 1982-1987) has led to a sort of "Catch-22" situation -- we need them so much, we can no longer afford them. That is because they now demand about five percent (5%) of the Army budget, and fleet replacement cost is now valued at approximately twenty billion dollars (\$20 B in FY 90 \$).<sup>1</sup>

Army planners approached the development of the 1989

Tactical Wheeled Vehicle Modernization Plan (TWVMP) with the intent of modernizing all segments of the fleet (trucks and trailers) during the thirty year planning period (1990-2020). The truck modernization problem, whose components are, a rapidly aging fleet, high cost to replace, and relatively low priority, was relegated to the "too hard box." Procurement dollars allocated to trucks were simply not adequate to fully modernize the fleet. Instead of modernizing, the TWVMP planned for asset shortages, retention of many maintenance intensive assets, and the resultant sub optimal costs of fleet ownership.

World events are now unfolding to reveal a new world order having altered security implications for the United States. This paper draws attention to the need to review and revise the 1989 TWVMP in anticipation of resulting requirements changes. Hypothetical force structure revisions are used as a means to assess new vehicle requirements levels, and the potential for TWVMP modifications.

An unusual opportunity now exists for the Army to move beyond the "sock syndrome" and fix that which the TWVMP deemed as "too hard," principally the aged medium fleet (2½ and 5 ton trucks). We can both modernize the truck fleet for a more capable force, and concurrently reduce the cost of ownership for the taxpayers. This can only be accomplished, however, if the Army recognizes the need to revise its 1989 TWVMP, analyzes potential force structure changes, and restructures planned



procurements to maximize the degree of fleet modernization while avoiding unneeded buys, and minimizing operating and support costs. If the Army moves quickly and smartly the Bush defense build-down may do more to modernize the Army's truck infrastructure than did the Reagan defense build-up.

### STUDY OBJECTIVES

The principal objectives of this study are simple yet multifaceted in execution. The objectives most pertinent to a useful end product are as follows:

1. To assess likely changes in truck requirements related to potential force structure realignments.
2. To analyze the impact of requirements changes on the 1989 approved Tactical Wheeled Vehicle Modernization Plan.
3. To determine if truck acquisition programs should be altered.
4. To draw conclusions about alternatives for change.
5. To document those conclusions as the framework for a future TWVMP revision.

### SCOPE OF STUDY

This study focuses on the potential change in requirements for U.S. Army trucks and the resultant effect on current and planned vehicle acquisitions. Not considered here are other Tactical Wheeled Vehicles (TWV) included in the TWVMP such as

trailers. Trucks included here represent about ninety-four percent of the dollar value of all TWV requirements. It encompasses the requirements for trucks irrespective of type of usage or category of authorization (I.E. Table of Organization and Equipment vs. Table of Distribution and Allowance). The study includes consideration of all TWV classes contained in the U.S. Army TWVMP approved by the Army Chief of Staff in April 1989.

#### STUDY METHODOLOGY

The methodological underpinning of this analysis is straightforward. A baseline for analysis must first be established. That baseline is the Army approved TWVMP which covers the time period 1990-2020. This plan of scheduled acquisitions is based on TWV requirements as generated by the Total Army Analysis process (TAA 93).

No detailed information is known about the Army force structure as it will exist 5-10 years from now, therefore assumptions are made which will facilitate the postulation of truck requirements changes. These hypothetical quantitative changes will be applied to each vehicle fleet. Once potential requirements numbers are generated they will be compared to current/planned acquisitions and resultant asset postures. These comparisons are intended to highlight any major programmatic adjustments which may be necessitated but not dwell on any minor fine tuning which is a function of annual cyclic reviews. Structural changes or

major programmatic shifts are the desired outcome, not minor re-programming actions.

If it is determined that program changes are desirable, or necessary, they will be documented as recommendations. [A graphic presentation of this methodology is shown at Figure I-1.]

#### STUDY METHODOLOGY

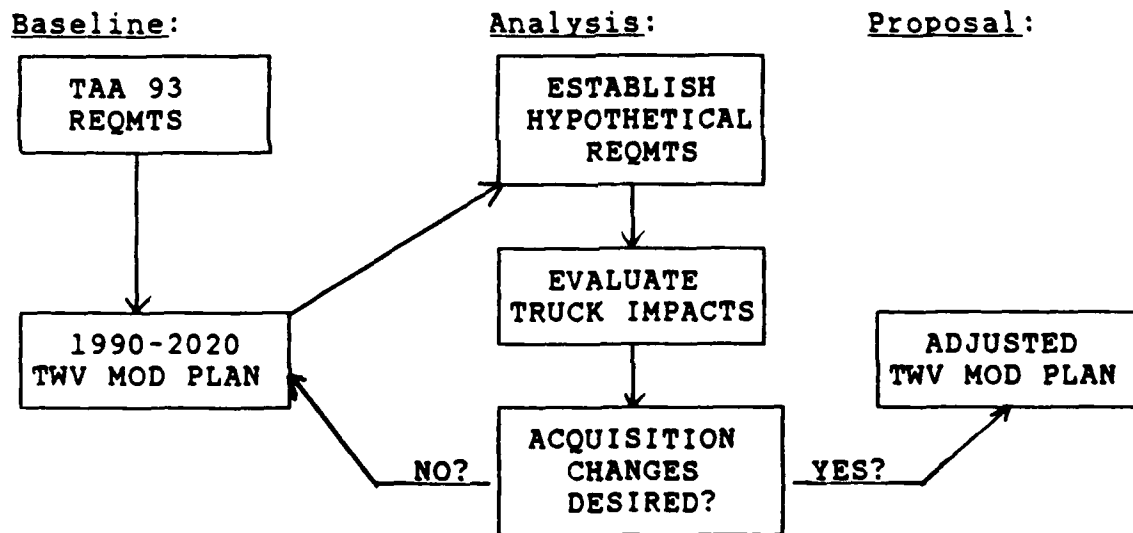


Figure I-1. Study Methodology

### ASSUMPTIONS

Acquisition programs which extend well into the future must have information about both current and future needs, with a relative degree of specificity. The projection of Army TWV requirements today is based upon the TAA 93 force structure. The following key assumptions are deemed necessary to any indepth review of mid-term (1995-2000) truck requirements as a variance from that baseline:

1. Force Size. The combination of world events, threat reassessments, and the need to reduce the U.S. budget deficit will force a reduction in U.S. Army personnel strength. For purposes of this study that reduction is assumed to be thirty percent (30%).

2. Unit Allocations. The number of vehicles authorized for specific unit missions will not change. If for example it now requires one 2½ ton truck with trailer to accomplish unit field feeding, that will not change. It is assumed that force structure changes will be accomplished through the reduction in unit numbers (E.G. fewer Battalions).

3. Vehicle Types. The types of vehicles required by a smaller Army are the same as those programmed today. The numbers by type will certainly change and possibly change priority orientation as well. Future change in vehicle types will be identified, as always, through the Training and Doctrine Command's (TRADOC) Concept Based Requirements System (CBRS).<sup>2</sup>

4. Proportionality. Tactical wheeled vehicles are required in virtually all tactical Army units, whether they be combat, combat support, or combat service support. Provided that unit allocations remain constant (Assumption 2) it is reasonable to assume a relatively constant proportionality exists between Army force structure (personnel end strength) and truck requirements. This assumption will permit estimations of truck requirements changes based on the Army's principal sizing parameter -- personnel strength.

CHAPTER II  
CURRENT TWV MODERNIZATION PLAN

GENERAL

In the FY 89 Defense Authorization Act, the House Armed Services Committee expressed concern over the Army's program for modernization of its truck fleet. As they saw it, the Army would require more than \$9 Billion for trucks over the next decade. In order to better understand the procurement decisions that would be facing them, the Congress directed the Army to provide a Tactical Wheeled Vehicle Modernization Plan covering the next decade which would:<sup>3</sup>

(1) Address the total force requirements presently and for the late 1990s...

(2) Address the economic useful life of the current fleet

(3) Explain the requirements and rationale of present Army policy concerning procurement/distribution of trucks into war reserves

(4) Detail the Army's proposed procurement strategies for modernizing the fleet

(5) Address the impact of current acquisition strategies on the production base

PURPOSE

TO DEVELOP AN AFFORDABLE AND EXECUTABLE  
LONG RANGE PLAN FOR TACTICAL WHEELED  
VEHICLE MODERNIZATION WHICH SATISFIES  
ARMY FORCE STRUCTURE REQUIREMENTS

Figure II-1. TWVMP Purpose

The Army leadership directed that a 30-year time frame (1990-2020) be used as the planning horizon for the TWVMP. This permits a focus beyond the remaining useful life of the existing fleet and examination of the replacement cycles of vehicles to be procured during the 1990s. The purpose of the TWVMP is to develop an affordable and executable long range plan for tactical wheeled vehicle modernization. Its intended usage was as follows:

(1) for development of the Army's long range research, development, and acquisition plan (LRRDAP) and its extended planning annex (EPA),

(2) as a road map for management of this tactical wheeled vehicle fleet,

(3) to build consensus in the Army and the Department of Defense on the need for sustained support of tactical wheeled vehicle modernization, and

(4) to obtain a consistent fiscal commitment to that end.

This plan was also expected to enable the army to explain

its truck acquisition strategy to industry, enabling them to better determine their corporate interest in Army programs, and to enlist the support of Congress in resourcing the Army's truck modernization requirements.

#### TACTICAL WHEELED VEHICLE FLEET ARCHITECTURE

The current fleet architecture is the result of decades of evolution. Operational concepts and equipment deficiencies are identified and pursued through the Concept Based Requirements System (CBRS). The CBRS and a variety of studies have transformed the Army's objective fleet of trucks from a multiplicity of body styles, payloads, and types to three basic fleet categories -- light, medium, and heavy. (See Annex A for a brief description of vehicles by type).

Each vehicle fleet serves a basic utility on the battlefield. Light vehicles serve predominately in command and control functions, medium vehicles as transporters of unit impedimenta, and heavy vehicles as key ammunition, and POL transporters. Each fleet has been developed and adapted to meet the battlefield deficiencies generated by the CBRS with an eye toward balancing capability with cost efficiency.

The objective Light Fleet (49% of total fleet) currently consists of two styles of vehicles, HMMWV, and CUCV. The HMMWV provides high mobility and survivability for combat commanders and their command/control systems. The CUCV fills similar roles



for CS/CSS organizations where survivability and mobility requirements are reduced. Each has a payload of approximately 1½ tons and serves as battlefield transport for unit commanders, communications platforms, ambulances, and in the case of the HMMWV, weapons platforms for such systems as the TOW missile.

The Medium Fleet Family comprises 42% of the total fleet requirement. It is divided into two payload classes. The Light Medium Tactical Vehicle (LMTV) having a 2½ ton payload capacity, and the Medium Tactical Vehicle (MTV) with a 5 ton payload. These vehicles are the workhorses of the battlefield serving as primary movers of unit equipment and personnel, e.g. basic loads of ammunition, barrier materials, packaged POL, rations, routine unit resupply, and numerous other high cube, mid-range payload requirements.

The Heavy Fleet (9% of total fleet) performs a variety of functions, most of which can directly influence the outcomes of battles. Their primary missions are in transport for immediate use, the high tonnage, high density, key combat consumables, such as tank/artillery ammunition and bulk fuel. Vehicles in this class also perform key recovery and heavy equipment transport missions. The current fleet consists of the 10 ton Heavy Expanded Mobility Tactical Truck, (HEMTT), as the primary tactical resupply vehicle for armor and artillery units (the Palletized Load System, PLS, will be introduced for artillery resupply in the 1990s), the M915 series tractor for line-haul, bulk resupply

operations, and the light, medium, and heavy equipment transporters (M916, M920, M911).

### FLEET ASSESSMENTS -- 1989

The TWVMP analyzed each fleet in the detail necessary to evaluate both quantitative and qualitative suitability. It reviewed each vehicle's ability to perform today's Airland Battle missions in terms of performance, availability, reliability, maintainability, supportability, and cost. Figure II-2 provides an overall general assessment of each fleet segment.<sup>3</sup>

CATEGORY	QTY O/H	ASSESSMENT	NEED	WARFIGHTING
<u>LIGHT</u> HMMWV CUCV  M151 SUSV	185045	FULLY CAPABLE AGING - NO CURRENT FOLLOW ON  OVERAGED FULLY CAPABLE	CONTINUE PROCUREMENT DEVELOP / PROCURE CUCV FOLLOW ON  RETIRE ARTIC MISSION	GREEN GREEN  AMBER GREEN
<u>MEDIUM</u> 2.5 TON   5 TON	128615	OVERAGED & COSTLY TO MAINTAIN  SHORT 15K - AGING ASSETS	SLEP 2.5 TON PROCURE LMTV - RETIRE OVERAGED ASSETS SLEP 5 TON PROCURE MTV - FILL SHORTAGES RETIRE OVERAGED ASSETS	RED   RED
<u>HEAVY</u> HEMTT COMM'L LINE HAUL <u>ENGINE TRANS</u> LIGHT MEDIUM HEAVY	22163	FULLY CAPABLE VEHICLE CAPABLE  FULLY CAPABLE OVERLOADED BY DOZERS CAN'T CARRY MBT	INVESTIGATE FETV REVIEW REQUIREMENT INVESTIGATE FETV  TIMED REBUY NEED HEAVIER LIFT CAPABILITY PROCURE 70T HETS	GREEN GREEN  GREEN AMBER GREEN (FIXED BY FY92)

Figure II-2. Assessment of Fleet - 1989

Recent Army procurements of heavy and light vehicles have significantly improved the capability of these fleet segments. The medium fleet has significant shortages, and consists of technologically obsolete, overage, and maintenance intensive vehicles with marginal mobility capability to support the Airland Battle.

#### MODERNIZATION STRATEGY

The general strategy employed in the TWVMP was to provide capable vehicles to support and sustain Airland Battle requirements while minimizing operating and support costs during peacetime utilization. To further define this a set of goals was established:<sup>6</sup>

1. Meet Battlefield Requirements -- Fill only essential battlefield requirements.

2. Reduce Costs -- The objective fleet management policy is to replace vehicles as they reach the end of their economic useful life. The Army Tactical Wheeled Vehicle Useful Life Determination Program (TWVULDP) methodology supports this policy and predicts the age at which it is most cost effective to replace vehicles.

3. Families of Vehicles -- The Army will continue to pursue the procurement of families of vehicles to reduce the variety of supported equipment. Families of vehicles offer commonality related advantages which include reduced support costs, simplified training requirements, and lower per unit cost.

### COST REDUCTION INITIATIVES

The TWVMP task force members recognized early the huge disparity between levels of funding required to meet modernization goals versus those anticipated. Many areas were identified which could reduce the cost of modernization and/or current operating and support costs. Those which represented the largest return on investment were lowered procurement objectives, accelerated vehicle retirements, and economic vehicle life extensions. Each of these will be briefly described.

Lowered Procurement Objective. The TWVMP establishes a Procurement Objective (PO) which is lower than the Army Acquisition Objective (AAO). The AAO is annually transmitted to Congress as the Army's aggregate needs to equip units and to provide stocks for combat losses and maintenance floats. The new Procurement Objective accepts a greater risk by decrementing late-deploying units by as much as 30% and significantly reducing stocks for wartime consumption. Figure II-3 reflects the new TWVMP Procurement Objectives by vehicle types. These quantities will be used as the baseline from which this study will later analyze potential changes.

# AAO VS TWVMP PO

<u>VEHICLE</u>	<u>AAO</u>	<u>TWVMP PO</u>
CUCV	86,502	65,875
HMMWV	125,033	70,128
2.5 TON	87,142	54,072
5 TON	109,204	66,712
HEMTT	20,009	13,139
PLS	4,333	4,333
LINE HAUL	7,919	7,382
LET	3,389	3,082
MET	1,341	779
HET	1,586	1,341
<u>TOTAL</u>	<u>429,721</u>	<u>286,843</u>

Figure II-3

SOURCE: TWVMP, Fig 4-8

Washout Policy. The lowered Procurement Objective equates to only sixty-six percent (286.8 K vs. 429.7 K) of the established AAO. This combined with expected procurements creates excess stocks in some fleet segments. A washout policy having the following criteria was determined to be necessary:

1. Vehicle quantities in excess of the Procurement Objective (by type) will be retired.
  2. A vehicle type having unacceptable performance characteristics may be selected for early retirement (E.G. GOER).
  3. A vehicle operating outside the U.S. which has exceeded its economic life expectancy is a retirement candidate.
- The TWVMP postulates that over 107,000 vehicles meeting these criteria, may be retired over the next ten years, yielding a significant savings in operating and support costs.

Service Life Extension Program (SLEP). The medium fleet is our most costly fleet to operate and support, due to its large numbers (42% of total requirement). The bulk of the medium fleet

consists of 1970s era technology and chassis which in the 2½ ton fleet averages 22 years of age. Since their economic life is set at 20 years, it now costs more to retain than to replace these vehicles. To acquire the 2½ ton Procurement Objective of 54,072 and fill some 15,000 5 ton vehicle shortages would cost almost \$4 Billion. To accomplish this and to continue procurement of other needed vehicles will take us well into the twenty-first century. Army planners accepted that budget restrictions would not allow short-term replacement of these aging assets -- The "too hard box." The O&S costs of these retained assets accelerate as they age. A Service Life Extension Plan (SLEP) was proposed which would reduce O&S costs and reduce the near-term need for procurement dollars. Figure II-4 represents an abbreviated description of the SLEP or remanufacturing process. Army guidance to the Tank Automotive Command who developed this scope of work was that the cost not exceed fifty percent of a replacement vehicle, and that at least a fifty percent extension in useful life would result.

#### **SLEP -- Abbreviated Scope of Work**

- Trucks Disassembled And Stripped To Frame
- Current Technology Diesel Engine Installed
- Redesigned Brake System
- New Power Steering System
- New Fuel System
- New Wiring Harness
- Rebuild/Replace As Necessary
  - Transmission
  - Transfer
  - Axles
  - Body Parts/Accessories

**Figure II-4. SLEP -- Abbreviated Scope of Work**

CUCV Life Extension. The CUCV, a commercially designed vehicle, has an engineering estimated life expectancy of 7 years. The vehicle, which was fielded from 1982-84, has not been in use long enough to accurately predict its economic life. Current data suggests, however, that it may be 10 or more years. The TWVMP, recognizing severely constrained resources, irrespective of economic life accepts the retention of CUCVs to 14 years.

CUCV Replacement. The HMMWV and CUCV both satisfy requirements for payloads in the 1½ ton range. The HMMWV due to its higher acquisition cost is currently limited to those areas requiring its mobility, survivability or other unique characteristics. The TWVMP developed data, though limited, suggested that when total life cycle costs were compared, the HMMWV may have a lower total ownership cost than CUCV. The TWVMP proposed to expand the collection of data necessary to support a 1995 decision to either replace CUCV with a similar commercial vehicle or procure more HMMWV to satisfy current CUCV documented requirements. The latter would result in an all HMMWV light fleet.

### CHAPTER III

#### BLUEPRINT FOR FORCE CHANGE

It will be the challenge of long-range analysts and planners throughout the Army to manage the changes required and desired to support the national security strategy in the years ahead. The architects of our future land forces will be faced with more expensive weapon systems, long development cycles, and constrained resources (personnel, equipment, natural resources and money). The structure and size of this future force will influence the structure (architecture) and quantitative requirement for future trucks. The world situation continues to change daily and a comprehensive national military strategy has yet to be formulated which addresses the unknown end state. There are, however, some documents, public debate, and senior Army leadership discussions which point the direction, if not, the final destination.

#### ARMY LONG-RANGE PLANNING GUIDANCE (ALRPG)

The Army Long-Range Planning Guidance is the lead document for directing change within the total Army, and for transmitting broad guidance for the future. It serves both to guide the operation of the Army's Concept Based Requirements System (CBRS) and to initiate periodic course corrections as required by environmental change. The current ALRPG (1990-2020) may no longer be



completely accurate in detail due to the rapidity with which the world is changing but it does reflect trends, influences, and essential features necessary to enter the twenty-first century with a capability range adequate to operate at any level on the spectrum of conflict.

The ALRPG draws together all the known influences and translates them into a range of options that have implications for the Army into the next century. Today, as U.S. national security strategy stands at a crossroads, these implications must be well understood in order to design the most capable and efficient Army to deal with future security needs. The ALRPG in part, provides the following guidance to Army planners and force designers:<sup>7</sup>

1. Countering the range of possible threats to our national interests requires Army forces capable of prompt and sustained military operations worldwide.

2. Such forces must be globally deployable, tactically mobile and sustainable.

3. Trained and ready Army forces, forward based and backed by rapid reinforcement from the United States are necessary to accomplish this strategy.

4. Our first out-of-homeland priority will continue to be Europe.

5. We will maintain robust reinforcing and contingency forces.

6. The Army must continue to prepare for a wide range of

possible conflicts in the world.

Several other influencing factors are also noted. Perhaps the single factor which may most affect truck requirements is the anticipated "nature of the battlefield." It predicts combat involving state-of-the-art forces, will feature operations by smaller sized, self-sustaining formations, increased unit mobility, agility, organic firepower, and improved command and control. Each of these, especially sustainment levels, unit mobility, and firepower, requires trucks to achieve.

#### OTHER CRITERIA FOR CHANGE

Many criteria could be established which would assist Army planners in sizing the force to meet national security objectives. One such criterion recently espoused by a senior Army leader was described as the "credible superpower" criterion. In his view the Army should seek to determine the minimum essential force size, in number of divisions, for example, that would allow the Army Chief of Staff to wake up each morning feeling confident that the United States is a "credible superpower." This is in theory a reasonable approach, though difficult in practice to determine, since the end state threat, or threats, are unclear, and ever changing. This approach assumes that the U.S. would be capable of responding to threats from any source, whether low intensity conflict or all-out conventional war.

Current strategic thinking on the approach to honoring our

NATO commitments is shifting. The established "Deterrence through Forward Deployments" strategy is being modified to a concept of "Deterrence through Forward Presence." This concept holds that with increased warning times NATO can be defended with fewer forward deployed forces -- more time exists to reinforce.

Preparation for large scale war depends on the ability to mobilize large numbers of units, personnel replacement, and the industrial base to produce war materiel. As the active force structure shrinks, the ability to expand takes on a heightened importance. This places increased reliance on Reserve Component forces, strategic lift capabilities, war reserve stocks, and the defense industrial base.

What force mix will the Army of the future contain? What will be the future ratio of heavy and light forces? This is important to the truck requirements equation because heavy forces have requirements for heavier trucks and in larger quantities. Recent Army leaders, in addressing the Army War College Class of 1990, have consistently predicted that the future Army will continue to be a mix of light, heavy, and special operating forces (SOF). Knowledgeable senior planners have speculated that the current ratio of light, heavy, and SOF will remain approximately the same, though the actual strengths of each will be less.

The end strength of the Army in the mid 1990 time frame and beyond is constantly being debated. No one seems to know where the falling numbers will stop. For purposes of this study I will

assume that the reduced size Army will be seventy percent of its current size and that the reduction will be proportional, across unit types. That is, both active and Reserve components will be cut thirty percent. This reduction is not unreasonable to assume, given that many are calling for cuts of up to fifty percent. The reduction is also large enough to assess where significant TWVMP shifts may be necessary.

CHAPTER IV  
HYPOTHETICAL REQUIREMENTS BASELINE  
QUALITATIVE CHANGES

The objective fleet architecture of light, medium, and heavy classes of trucks are not expected to change as a result of a smaller force structure. Requirements studies over time have served to fix a range of payload categories and other vehicle characteristics such as mobility. The objective fleet to which we are evolving contains a broad mixture of vehicles to match battlefield needs. Assuming that the mix of heavy and light forces remains relatively constant (as a percent of the whole), the objective mix of vehicle characteristics are not expected to change appreciably. No new requirement is envisioned for a special truck class emanating from a down sized force.

QUANTITATIVE CHANGES

A smaller force will result in requirements for fewer trucks. The question is: By how much will the requirement be reduced? Since trucks are embedded in all Army units, any change to the number of units will result in a change to the number of trucks required. The TWVMP, as previously noted, did not relate specific numbers of trucks required by type. It did, however, use unit and stockage requirements as a basis to compute procurement objectives. The procurement objectives are requirements

based but, allowing some late deploying units, to be decremented by as much as thirty percent.

Figure IV-1 below establishes a new hypothetical procurement objective for each vehicle under study. These are arrived at by accepting the TWVMP procurement objective as modified by the study assumptions. That is, if the force is reduced by thirty percent (-30%), and the force mix remains relatively constant, then the resultant impact on each class of truck is a requirement (and procurement objective) of approximately thirty percent less. The application of this thirty percent reduction may be seen in the following table. The derived hypothetical Procurement Objective (PO) is the basis for subsequent analysis and discussions.

HYPOTHETICAL PROCUREMENT OBJECTIVES (PO)

<u>VEHICLE</u>	<u>TWVMP PO</u>	<u>HYPOTHETICAL PO</u>
<u>LIGHT</u>		
HMMWV	70,128	49,090
CUCV	65,875	46,112
<u>MEDIUM</u>		
2.5 TON	54,072	37,850
5 TON	66,712	46,698
<u>HEAVY</u>		
HEMTT	13,139	9,197
PLS	4,333	3,033
M915	7,382	5,167
LET	3,082	2,157
MET	779	545
HET	<u>1,341</u>	<u>939</u>
TOTAL	286,843	200,790

Figure IV-1. Hypothetical Procurement Objectives

CHAPTER V  
FLEET ASSESSMENTS BASED ON  
HYPOTHETICAL REQUIREMENTS

GENERAL

The previous chapter established a new hypothetical procurement objective for a modified TWVMP. This chapter will analyze some alternatives for change. Here comparisons will be made between the new hypothetical procurement objectives, relative fleet ages, asset postures, and the approved TWVMP schedule of procurements. These comparisons should yield information upon which to base conclusions and resultant recommendations for change.

Figure V-1 reflects the approved TWVMP scheduled acquisitions for each vehicle under study during the period 1990-2020. [It also contains the Small Unit Support Vehicle (SUSV) not discussed here.] It should be noted that procurements of CUCV are not shown. A decision point is scheduled in 1995 to determine whether CUCV replacements should be with similar commercial vehicles or HMMWV. The TWVMP includes CUCV replacements in 1997 and beyond, as HMMWV. Similarly, heavy fleet vehicles procured in 1997 and beyond, are listed as Family of Heavy Tactical Vehicles (FHTV). A 1994 decision point is scheduled to determine if all the various vehicles in the heavy class should be included in a single FHTV.

TWVMP PLANNED PROCUREMENTS  
(FY 90 CONSTANT \$ IN M/QTY)

	90	91	92	93	94	95	96	97	98	99	00
CUCV	1					ΔΔ					
HMMWV	203/8517	225/8484	203/7876	187/7640	75/2820	AAA		200/7016	370/1288	370/1288	370/1288
SUSV	26/182	26/184									
2.5T SLEP				29/1400	67/3300	67/3300	67/3300	67/3300	67/3300	67/3300	67/3300
LMTV			50/735	100/1471	100/1471	100/1471	113/1663	113/1663			
5T SLEP	Δ					17/6402	25/840	25/840	25/840	25/840	25/840
MTV	ΔΔ	70/637	167/2012	257/3092	257/3092	320/3859	319/3840	187/2294			
PLS	39/105	211/784	258/867	253/848	339/922	263/607	246.7/FR				
FHTV					Δ			148/874	203/1606	325/1815	325/1815
HET*	42	85	125								

	01	02	03	04	05	06	07	08	09	10	11
CUCV											
HMMWV	370/1227	350/1227			50/1754	100/3500	350/1227	350/1227	350/1227	50/1754	100/3500
SUSV		71/487	87/600								
2.5T SLEP	67/3300	67/3300									
LMTV		39/573	78/1147	78/1147	91/1338	91/1338	52/764	65/856	65/856	141/2076	116/1700
5T SLEP											
MTV		111/1338	222/2676	222/2676	257/3122	257/3122	148/1784	185/2230	185/2230	321/3867	286/3500
PLS											
FHTV	330/1943	183/861	382/2250	382/2250	382/2250	382/2250	200/1174	136/800	160/1000	237/1400	237/1400
HET*											

	12	13	14	15	16	17	18	19	20
CUCV									
HMMWV	364/1276	364/1276	300/1052	50/1754	100/3500	300/1052	300/1052	300/1052	163/5719
SUSV						71/487	87/600		
2.5T SLEP									
LMTV	50/737	65/856	78/1147	122/1787	91/1338	39/574	65/856	78/1147	91/1338
5T SLEP									
MTV	100/1205	185/2230	222/2676	281/3506	250/3122	87/1048	185/2230	222/2676	250/3122
PLS									
FHTV	237/1400	136/800	160/1000	237/1400	237/1400	237/1400	136/800	160/1000	237/1400
HET*									

Figure V-1. TWVMP Schedule of Procurements



Figure V-2 reflects the ages of vehicle assets as described in the TWVMP. It notes by vehicle type the expected economic life as compared to the average fleet age for the year 1990.

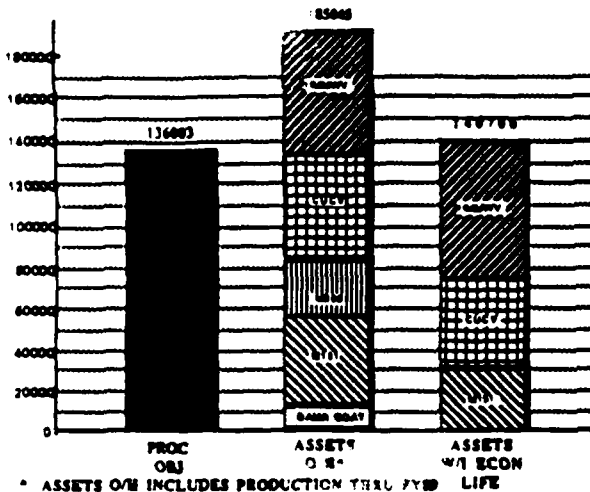
ECONOMIC LIFE VS. ASSET AGE

<u>VEHICLE</u>	<u>ECONOMIC LIFE</u>	<u>FLEET AGE 1990 AVG</u>
CUCV	7	7.5
HMMWV	14	6.2
2.5 TON	20	21.7
5 TON	22	13.9
HEMTT	20	4.9
PLS	20	0
LINE HAUL	20	8.9
LET	20	9.1
MET	20	11.2
HET	14	9.5

Figure V-2. Fleet Age

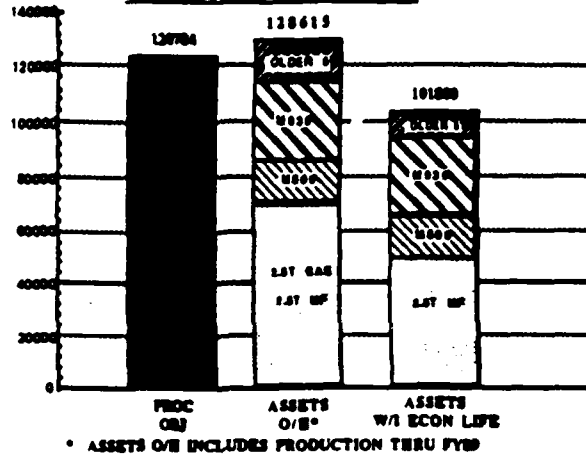
Figures V-3, V-4, and V-5 taken from the TWVMP show asset postures for the light, medium, and heavy fleets. They compare the TWVMP approved procurement objectives by fleet with assets on hand. Many of the current assets are not in the objective fleet, but are older vehicles substituting for newer ones. For example, the light fleet requirements are being satisfied not only with HMMWV and CUCV (objective vehicles) but also with older M880s, M151s, and Gama Goats (substitute vehicles). The charts also reflect the number of assets by type which have not exceeded their economic useful lives.

**LIGHT: ASSET POSTURE**



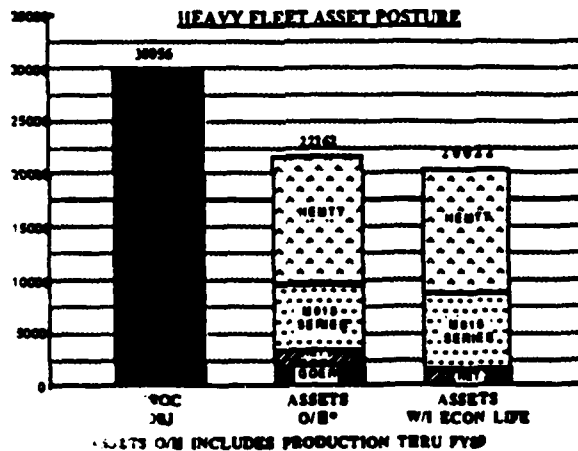
**Figure V-3**

### MEDIUM FLEET ASSET POSTURE



**Figure V-4**

## HEAVY FLEET ASSET POSTURE



### Figure V-5

The remainder of this chapter will review and critique the TWVMP level of resource commitment, light/medium/heavy fleet age, assets and planned procurements in light of hypothetical procurement objectives. Potential impacts and alternatives are also identified and discussed.

### LEVEL OF COMMITMENT ASSESSMENT

The TWVMP institutes a level funding concept for the procurement of TWV. Both an optimum level and a funding floor were established. It states that the Army requirement for TWV equals \$1.2 Billion per year (FY 89 constant \$) in investment monies. This annual level of funding is necessary to acquire the required quantity of TWV (IIQ + POMCUS) and to enable their retirement when it is most economical to do so.

An alternate level of funding was also established. This level of \$750 M (+, - 15%) for trucks plus \$50 M for trailers is known as a stable funding floor. This level allows the Army to fill only the highest priority units with vehicles within economic life constraints. The Army decided to support annual TWV procurements at the floor level and to pursue the optimum level (best case) should additional resources become available.

Funding at the \$1.2 B annual rate would acquire and maintain economic vehicles for all unit requirements at 100% fill rates. The floor level of funding strategy accepts the retention of large numbers of vehicles which would be more cost effective to replace. The \$800 M floor accepts an overall fill rate of only 67% (IIQ + POMCUS) with vehicles within economic life ( $\$800 \text{ M} \div \$1.2 \text{ B}$ ). In other words, the Army TWVMP accepts a 67% solution in its TWV fleet. The remainder of the procurement objective quantity is to be filled with vehicles beyond the age at which it would have been more cost effective to replace. The level of

funding supported by the Army allows significant vehicle shortages to exist and retains vehicles which are no longer economical to operate -- A non-optimal situation in all respects.

If the requirement for trucks is reduced by 30%, what level of funding should now be supported? Perhaps a better question is, should the annual funding be level? Level funding, as a concept, is certainly advantageous for the budgeters. But is it a viable approach to procuring items which replace others that were bought in cycles? Previous cyclic procurements for CUCV, 2½ ton, and 5 ton trucks drive the need for future dollars. As the TWVMP correctly points out, replacing aging vehicles on schedule, reduces the overall cost of ownership. To prolong that, through level funding caps, as the TWVMP does, is not by definition, the most cost effective approach. Level funding, it seems, while easier in program execution, creates a non-optimal fleet asset posture and resultant higher O&S cost structure. The lowest life cycle cost to the fleet owner (Army in this case) would be achieved if funding were allocated on need to replace vs. need to be constant.

If level funding is mandated, for whatever reasons, how should it be adjusted in light of a 30% reduction in requirement? Either of two basic approaches may be taken. First is the "same level of commitment" approach. This approach would hold that if requirements drop by 30% then the optimum and funding floors would be reduced by 30% accordingly. (i.e. to \$840 M and \$560 M

respectively). The \$840 M now representing a 100% unit requirements fill with vehicles within economic life parameters, and the \$560 M representing a 67% solution. The other approach can be referred to as the "more capable force" approach. This approach would fund at the required level (\$840 M per year in FY 89 constant \$). Proponents of this approach would argue that a smaller force should be a more capable force for its size. It should be fully equipped, and with state-of-the-art hardware. This approach is more consistent with the ALRPG previously discussed. For a smaller force to be a credible representative of a superpower it must be robust in every way. Other funding options can be constructed but they would merely be variations of these two, so they will not be pursued.

#### LIGHT FLEET ASSESSMENT

Should the requirement for light fleet vehicles be reduced by 30%, some significant changes in the TWVMP may be necessary. The current CUCV asset posture of approximately 60,000 exceeds the postulated new Procurement Objective of 46,112 by almost 14,000 vehicles. The average age of these assets in 1990 is seven plus years (estimated economic life is 7 years). The TWVMP does not schedule replacements to begin until 1997. These replacements, depending on the TWVMP scheduled comparative life cycle cost analysis, could be HMMWV. A reduced Procurement Objective allows either significant vehicle retirements or transfers into non use accounts such as war reserves. It may also

influence the desirability of a one vehicle light fleet.

HMMWV. A new five year multi-year procurement for 33,000 more HMMWV was just signed in the summer of 1989. Total assets acquired from this and previous procurements will be approximately 83,000 vehicles. This quantity exceeds the hypothetical Procurement Objective of 49,090 by almost 34,000. Unchanged, this future production would provide either the opportunity to put large quantities of HMMWV into war reserves and other stockage categories, or to begin replacing the aging CUCV. A third option would be to cancel the current contract.

Light Fleet Summary. The assumed change to HMMWV/CUCV Procurement Objectives will necessitate the "single vehicle light fleet" decision point of 1995 be reevaluated. An earlier decision can affect not only the CUCV replacement but also the current HMMWV contract. An early decision would allow the transition to an all HMMWV light fleet at an earlier time frame without serious contract alterations. This would also permit CUCV retirements more closely aligned with economic life estimates. The end result would be a more cost-effective light fleet, and one which has a greater capability consistent with a smaller force.

#### MEDIUM FLEET ASSESSMENT

What issues regarding the medium fleet need to be addressed if our hypothetical force reduction occurs? The medium fleet, especially the 2½ ton truck, is in the most serious need of at-

tention. Collectively, the 2½ ton is the oldest fleet in current service having been procured during the Vietnam War years, and is due for replacement. The cost to replace, combined with the relatively low priority assigned 2½ ton vehicles, drove Army planners to seek a SLEP which would restore some lost performance and reduce operating and support costs. Should the requirement for medium fleet vehicles be reduced by 30%, significant TWVMP revisions could and should occur.

2½ Ton. The current 2½ ton asset posture of approximately 67,000 assets exceeds the postulated new Procurement Objective of 37,850, by more than 29,000. This reduction would create a significant excess of on-hand over and above the Procurement Objective. This situation would permit either the transfer of large numbers into war reserves and other non use accounts or the acceleration of large scale retirements. Placing large numbers into storage, however, has costs associated with preparation for storage, storage facilities, and care while in storage. The retirement option conversely carries little cost penalty to exercise.

The Family of Medium Tactical Vehicles (FMTV) will eventually replace both current 2½ and 5 ton trucks. Only about 8500 LMTV (2½ ton) vehicles are scheduled to be produced throughout the remainder of this century. The less than optimal SLEP represents the means by which more capable assets can be retained. While this will be more cost effective (total life cycle) than to

continue use as is, it will not be as cost effective as replacement vehicles.

5 Ton. The 5 ton portion of the TWVMP may warrant major changes if the requirement is reduced as postulated. Current 5 ton assets plus the receipts from the ongoing M939A2 production will result in assets of approximately 64,000 vehicles. Some portions of the fleet are older than 25 years, but on the whole are younger than the 2½ ton segment of the medium fleet. The postulated new Procurement Objective of 46,698 will exceed on hand assets (in 1992) by more than 17,000 vehicles. This excess to the hypothetical Procurement Objective would allow either the stockage of older assets, or the retirement of large numbers of aging vehicles.

Perhaps the largest impact is that the immediate need to buy 5 tons to fill shortages disappears. The need to replace older vehicles remains, but the priority warranted is lessened. This reduced requirement may also obviate the need to SLEP 5 ton trucks. Current large quantities of older vehicles dictates that to meet commitments to the Environmental Protection Agency, either a SLEP or repower option is needed. Reduced requirements may permit these vehicles to be retired, thus avoiding either option's necessity.

Medium Fleet Summary. A reduced requirement may have some very beneficial effects upon the medium fleet. If 5 ton shortages disappear, the emphasis on the 5 ton variant (MTV) of FMTV



may no longer be valid. The opportunity exists to shift emphasis to the 2½ ton variant (LMTV) of FMTV. This shift would allow the LMTV to be procured first, and at continuing rates greater than for the MTV. This action would accelerate the rate of modernization of the fleet segment in most dire need of help. A need still exists in the 1990s to procure the MTV, though in lesser quantities and at later dates. The FMTV procurement emphasis on the 2½ ton variant may also allow the acquisition of vehicles soon enough that a SLEP is no longer a desirable course of action.

#### HEAVY FLEET ASSESSMENT

The heavy fleet of today consists of a variety of vehicles. These include the Heavy Expanded Mobility Tactical Truck (HEMTT), the M915 family of tractors for line haul (M915) and equipment transporters (M916, M920), and the Heavy Equipment Transporter (M911). Of most immediate concern are the new 70 ton HET and the Palletized Load System vehicles because production contracts have been let or will be this summer. Though these contracts are for relatively small quantities, due to the high per unit cost, the programmed dollars are substantial.

Palletized Load System (PLS). The PLS is currently undergoing competitive prototype testing and evaluation. A production contract is scheduled for the summer of 1990. The TWVMP calls for the procurement of 4,333 vehicles in fiscal years 1990-1995. This quantity would fill the full current validated requirement

(IIQ and POMCUS) necessary to support the Maneuver Oriented Ammunition Distribution System for which it is designed. A thirty percent reduction in requirement would yield a new Procurement Objective of 3,033. This new Procurement Objective would eliminate the need for the last 1300 vehicles scheduled for production. This could cancel the planned FY 95 PLS production, about two-thirds of the FY 94 PLS vehicle production and thirty percent of the FY 96 flatrack production. These substantial monies released could be shifted to accelerate FMTV procurement.

Heavy Equipment Transporter (HET). The HET is required to accommodate the heavier versions of the M1 main battle tank. A contract was recently let for 1,044 HET tractors. The planned Procurement Objective of 1341 is 402 greater than the hypothetical Procurement Objective. This new quantity would obviate the need to exercise contract options that allow procurements up to the planned level. This too, would serve to eliminate the need for some funds necessary to procure the last increment of vehicles. These could also be diverted to the FMTV program.

Heavy Expanded Mobility Tactical Truck (HEMTT). The HEMTT fleet will be in good condition with a Procurement Objective reduced by 30%. This assumes that the body style mix remains unchanged. That is, no major disparity exists with required numbers of tanker, cargo, or wrecker types and their asset posture. A reduced requirement will serve to permit this critical fleet segment to fulfill unit requirements. Some excesses to

unit requirements may allow larger quantities to be placed in POMCUS and war reserve stocks. The hypothetically reduced requirement would enable this fleet to essentially be fixed until it is due cyclic replacement starting in 2005.

M915 Family. Additional quantities of M915 line haul tractors and M916 equipment transporters are currently being produced. These small quantities would not have filled the TWVMP Procurement Objective. By reducing the requirement this current contract may fulfill the new need until older vehicles in this fleet segment should be retired, and replaced.

Family of Heavy Tactical Vehicles (FHTV). The FHTV is a notional program which would combine all heavy truck procurements into a family of vehicles. This approach has been successfully accomplished in other areas of the fleet. The HMMWV is a family of some 14 different vehicle variants on a single chassis. The Family of Medium Tactical Vehicles currently in prototype testing combines both 2½ and 5 ton payload classes, in multiple body styles, into a single family. The FMTV will yield vehicles which meet the users' requirements for capability, and also represent the best value for the Army. Production costs, operating and support costs, as well as total life cycle costs will be less for the family than if totally separate vehicles were produced.

No detailed analysis has yet been conducted, however, to determine the technical feasibility of an FHTV. Informal discus-

(high mobility to tactical support mobility) and payloads (10 ton cargo to 70 ton tractors) needed would yield a family of at least two and probably three different chassis. The range of required characteristics in the heavy class appears less likely to yield the benefits of single family classes as have been achieved in the medium and light classes.

The TWVMP schedules a 1994 decision point at which time an FHTV go/no go strategy decision is to be made. The presumption was that the PLS would be the base vehicle of this family. In 1994 the PLS would be nearing its production run, and a 1994 decision would permit further heavy class vehicles to be procured, through PLS as the base, without a break in production. The postulated reduced requirement for PLS obviates the need for 1995 vehicle production and most of the 1994 planned production. If the PLS is to be considered a basis for FHTV, then the 1994 decision point must be rescheduled to an earlier date. This is necessary if the avoidance of a production break is considered important.

## CHAPTER VI

### CONCLUSIONS AND RECOMMENDATIONS

#### CONCLUSIONS

Modernization planning is by nature a continuous process. Any long range plan, though valuable, must periodically be re-evaluated and adjusted as new and relevant information and planning factors become available. Though just approved last year, the TWVMP must be reviewed and adjusted within the context of a changing force structure. Though the end state of the Army force structure is unknown at this time it is accepted that the Army will be smaller. Application of the force assumptions postulated in this paper, to the recently approved Army Tactical Wheeled Vehicle Modernization Plan yield a number of conclusions relative to alternatives for change. Those conclusions which may most directly affect near-term decisions, procurements, and long-term fleet health are as follows:

1. General.

- a. Force structure reductions will result in relatively proportional truck requirements (e.g. a 30% force reduction will result in an approximately 30% truck requirement reduction).

- b. A significant reduction in the Army force structure (30% or more) will create the need for major shifts in mid-term vehicle procurement needs, relative program priorities, and scheduled decision points.

c. The overall requirement for funds to procure vehicles, and to sustain a smaller fleet will be reduced.

d. The reduced annual funding required (at 30% reduction in requirement) may approximate the level of funding accepted by Army leadership as the "funding floor" (\$800M/year).

e. Level funding does not produce a fleet which results in lowest life cycle costs.

f. Significant requirements reductions offer the Army a unique opportunity to shift program priorities and funding support to fix the fleet that is broken -- the medium fleet.

g. Changes in strategic emphasis from heavy forces to light forces warrant placing a higher acquisition priority on medium fleet vehicles (FMTV) at the expense of heavy fleet vehicles (PLS etc.).

## 2. Light Fleet.

a. Postulated changes to the HMMWV Procurement Objective will create a significant excess if the TWVMP planned procurement is executed.

b. A smaller force with greater emphasis on more flexible capabilities may warrant a shift to an all HMMWV light fleet vs. a mixed fleet of HMMWV/CUCV.

c. Accelerated retirements of GAMA Goats, Jeeps, M880s, and CUCV may now be desirable.

d. The single vehicle light fleet decision needs to be made sooner in order to either allow for earlier HMMWV production

cessation or conversely to increase production quantities to additionally satisfy CUCV replacement needs.

### 3. Medium Fleet.

a. Postulated requirements reductions eliminate current 5 ton truck shortages (compared to Procurement Objective).

b. A resultant shift in procurement priority from the MTV (5 ton) to the LMTV (2½ ton) is now possible. This could result in:

(1) Accelerated procurements of LMTV

(2) Accelerated retirements of on hand, overage, maintenance intense 2½ ton trucks

(3) Making a SLEP for 2½ ton trucks unnecessary

c. With reduced requirements, and current M939A2 output, a 5 ton SLEP should be unnecessary.

d. Increased emphasis in FMTV procurements, especially the LMTV, represent the best way to fix the medium fleet and reduce the total fleet ownership cost.

### 4. Heavy Fleet.

a. Requirements reductions may cause a need to terminate the PLS production sooner than planned.

b. A shorter PLS production run would create the need to make an FHTV decision sooner.

c. Reduced requirements for all heavy fleet vehicles, coupled with the already aggravating diversity in vehicle characteristics, and scattered needs for replacement, make the via-

bility of an FHTV even more doubtful.

d. A shortened PLS program would release funds which could be diverted to the needed FMTV.

The matrix at Figure VI-1 illustrates by vehicle program those areas subject to change if study assumptions are valid.

#### POTENTIAL TWVMP CHANGES

VEHICLE	FY 91-99 QUANTITY	RELATIVE PRIORITY	RETIREMENT SCHEDULE	PROGRAM DECISION POINTS
<u>LIGHT</u>				
CUCV	X		X	X
HMMWV	X	X	X	X
<u>MEDIUM</u>				
2½ T	X	X	X	
5 T	X	X	X	
2½ T SLEP	X	X		
5 T SLEP	X	X		
<u>HEAVY</u>				
PLS	X	X		
HET	X	X	X	
FHTV	X	X		X

Figure VI-1 Potential TWVMP Changes

#### RECOMMENDATION

The above conclusions were arrived at by means of a hypothetical construct of a future army force structure 70% of that now in place. It is unlikely, let's say, that the 1996 force structure will perfectly match that template. If, however, the Army of the mid-term (1994-2000) approaches the underlying as-



sumptions of this paper, the above conclusions related to the 1989 TWVMP appear reasonable.

The Army, it seems to me, has an unusual and timely opportunity here. The past decade has seen much decline in the medium wheeled vehicle fleet. That decline in terms of aged assets continues with the TWVMP. The TWVMP acknowledged this, but found no way of alleviating the continued aging of the medium fleet (the infrastructure) given the requirements growth of the 1980s and the shrinking budget of the 1990s. A reduced army force structure may have a silver lining. When requirements decline we have the opportunity to retire older, maintenance intensive vehicles, and to buy those which are both more capable and less expensive to operate and maintain.

In short, the unfolding world events, with a lessened threat, and a smaller Army may do more to modernize the U.S. Army truck fleet than our best efforts at devising a TWVMP. The opportunity now exists to fully modernize all segments of the TWV fleet, if we act quickly and prudently to alter the course set last year in the TWVMP. A fully capable force for the future and many billions of dollars are at stake.

It is believed that the above conclusions should be core considerations for a revised TWVMP. The more detailed truck program adjustments (the eaches), of course, must follow known force structure adjustments. These conclusions can, however, form the basis for, and frame the issues around the next TWVMP. I recommend that they serve to fashion the opening agenda.

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ANNEX A

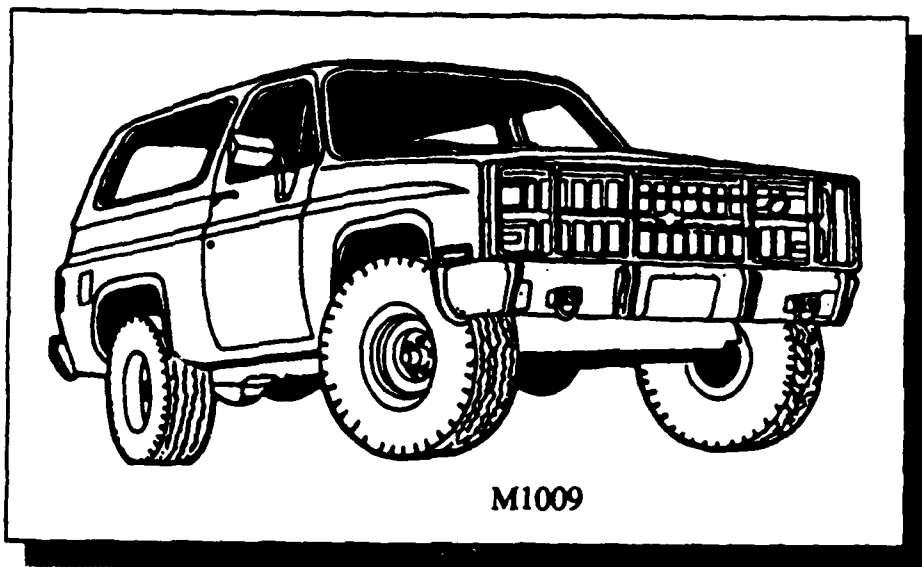
U.S. Army Truck Fleet, by Fleet Segment:

## **LIGHT VEHICLE FLEET**

# COMMERCIAL UTILITY CARGO VEHICLE (CUCV)

M1008/M1009: 1-1/4 & 3/4 TON

SSN: D113



## PRIMARY MISSIONS

- COMMAND, CONTROL AND COMMUNICATION
- COMBAT SERVICE SUPPORT

## TERRAIN

- ON-ROAD AND LIMITED OFF-ROAD

## CONFIGURATIONS

- UTILITY - M1009
- CARGO - M1008
- AMBULANCES - M1010
- SHELTER CARRIER - M0128
- SHELTER CARRIER, DUAL REAR WHEEL - M1028A2

The Commercial Utility Cargo Vehicle, commonly called the "CUCV" has replaced the majority of the M880 Series of vehicles. In addition, the utility body style of the CUCV is one of the principal replacements for the M151 Jeep.

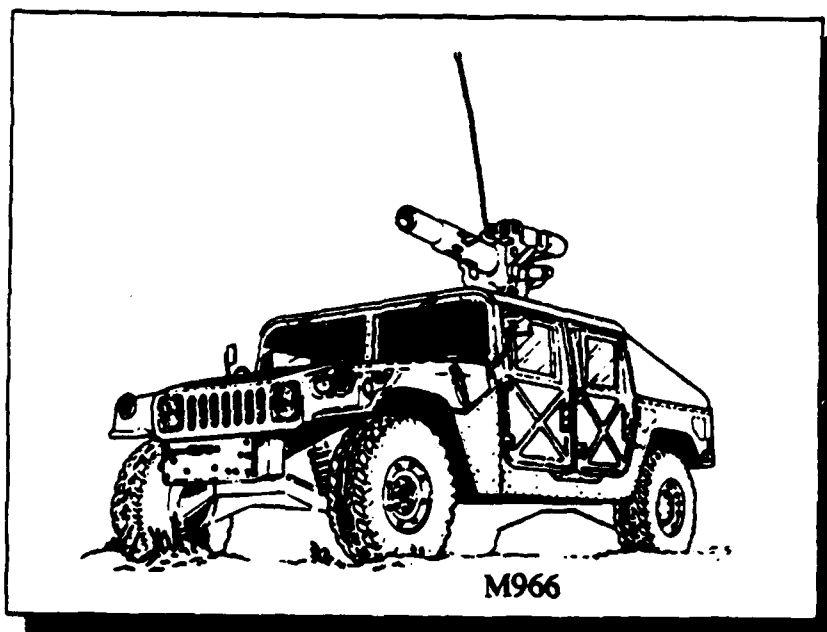
CUCV production is complete with delivery of over 70,000 vehicles to forces (including chassis for special applications) for use in the less demanding light load roles.

The basic vehicle is nearly identical to its commercial counterparts, the Chevrolet Blazer and the Chevrolet pick up truck, with the exception of minor modifications required for military use, particularly in the area of electrical system and add-on kits.

# **HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)**

**M998 SERIES: 1-1/4 TON**

**SSN: D154**



## **PRIMARY MISSIONS**

- WEAPONS TRANSPORT
- COMMAND, CONTROL AND COMMUNICATION
- TROOP/CARGO TRANSPORT

## **CONFIGURATIONS**

- WEAPONS CARRIERS
- UTILITY
- AMBULANCES
- SHELTER CARRIER

## **TERRAIN**

- HIGH AGILITY BOTH ON-ROAD AND OFF-ROAD

The High Mobility Multipurpose Wheeled Vehicle, commonly called the "HMMWV" is performing those 1-1/4 ton missions which can not reasonably be performed by the less expensive Commercial Utility Cargo Vehicle (CUCV). It is the high mobility member of the light fleet and provides the Army with a high performance, light load vehicle for the forward area.

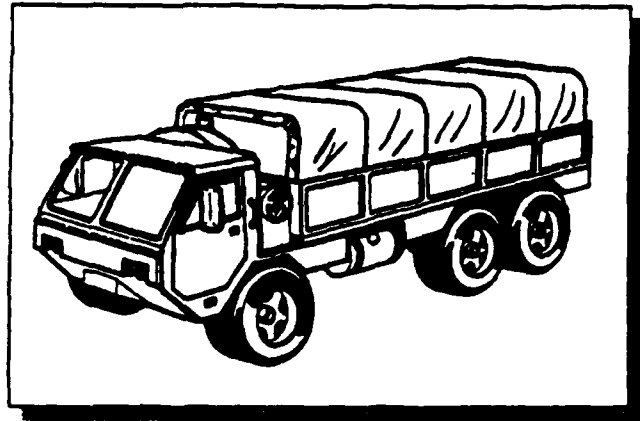
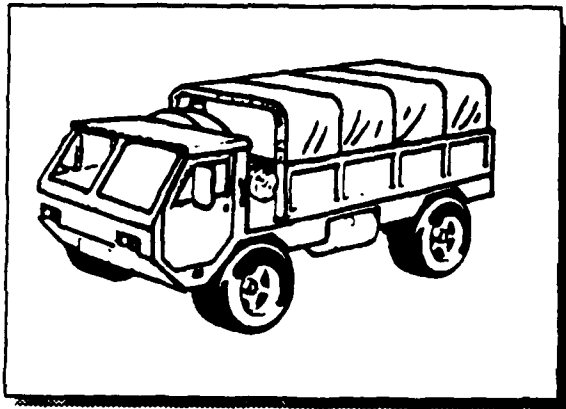
AM General was awarded a production contract in March 1983. This multi-year contract covered a period of five years and has provided approximately 70,000 vehicles (including deliveries to the USMC, Air Force and Navy). The first vehicles (utility and weapons carriers) were fielded in October 1985.

## **MEDIUM VEHICLE FLEET**

# **FAMILY OF MEDIUM TACTICAL VEHICLES (FMTV)**

**SSN: D135-Light Medium Tactical Vehicle (LMTV)**

**SSN: D145-Medium Tactical Vehicle (MTV)**



## **CONFIGURATIONS-LIGHT VARIANT (LMTV)**

- CARGO
- VAN

## **PRIMARY MISSIONS**

- UNIT MOBILITY
- TRANSPORT OF EQUIPMENT AND PERSONNEL

## **TERRAIN**

- ON-ROAD AND OFF-ROAD

## **CONFIGURATIONS-MEDIUM VARIANT (MTV)**

- CARGO W/ & W/O MHE
- LONG WHEELBASE CARGO W/ & W/O MHE
- EXPANSIBLE VAN
- TRACTOR
- DUMP
- WRECKER
- TANKER

The Family of Medium Tactical Vehicles (FMTV) will provide enhanced reliability and performance capabilities along with reduced logistics cost. Both the existing 2-1/2 and 5 ton trucks were designed in 1949 and have undergone some improvements through the years. However, much of the basic chassis, axles and other components have remained unchanged for the past four decades. The new Family of Medium Tactical Vehicles will enable the Army to capitalize on the technological advancements developed commercially over the past forty years for performance and operational benefits. FMTV will also increase the amount of parts interchangeability and logistics support ability between these two vehicle payload categories.

Two tactical trailer models will complement the FMTV, providing 2-1/2 ton and 5 ton payload capabilities.

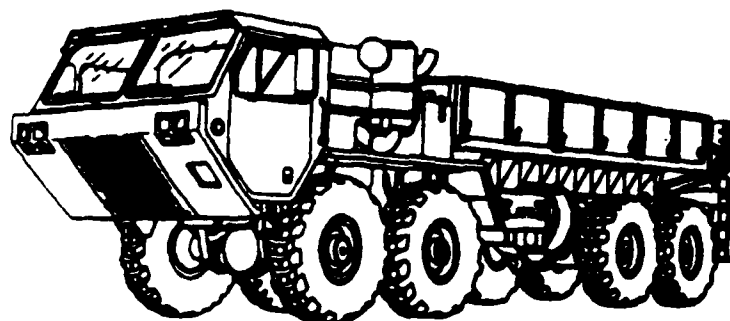
Production award is scheduled for early FY91.



## **HEAVY VEHICLE FLEET**

# **HEAVY EXPANDED MOBILITY TACTICAL TRUCK (HEMTT)**

**M977 SERIES: 10 TON  
SSN: D162**



**M977 CARGO TRUCK**

## **PRIMARY MISSION**

- RESUPPLY OF COMBAT VEHICLES AND WEAPON SYSTEMS

## **TERRAIN**

- ON-ROAD AND OFF-ROAD

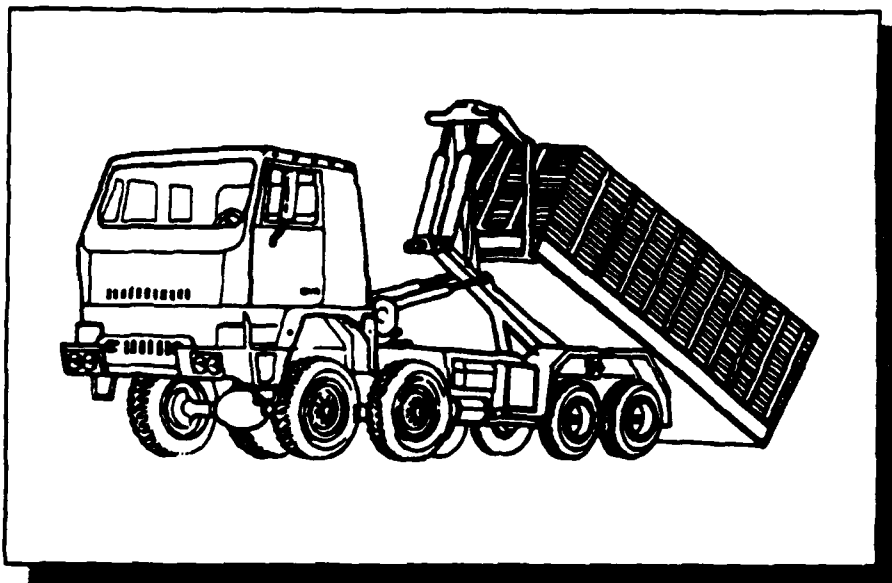
## **CONFIGURATIONS**

- CARGO WITH CRANE
- FUEL TANKER (2500 GAL.)
- TRACTOR
- WRECKER
- CARGO WITH HEAVY CRANE

The Heavy Expanded Mobility Tactical Truck (HEMTT) is providing increased transport capability for re-supply of combat vehicles as well as a number of special purpose missions. The characteristics of the HEMTT provide a modern, high performance heavy duty truck for the U.S. Army.

# **PALLETIZED LOAD SYSTEM (PLS)**

**SSN: D165**



## **PROPOSED CONFIGURATIONS:**

- AMMUNITION TRANSPORT
- BREAK BULK TRANSPORT
- SPECIAL REAR BODY

The Palletized Load System (PLS) will consist of a 16.5 ton truck, a trailer and interchangeable/demountable cargo flatracks.

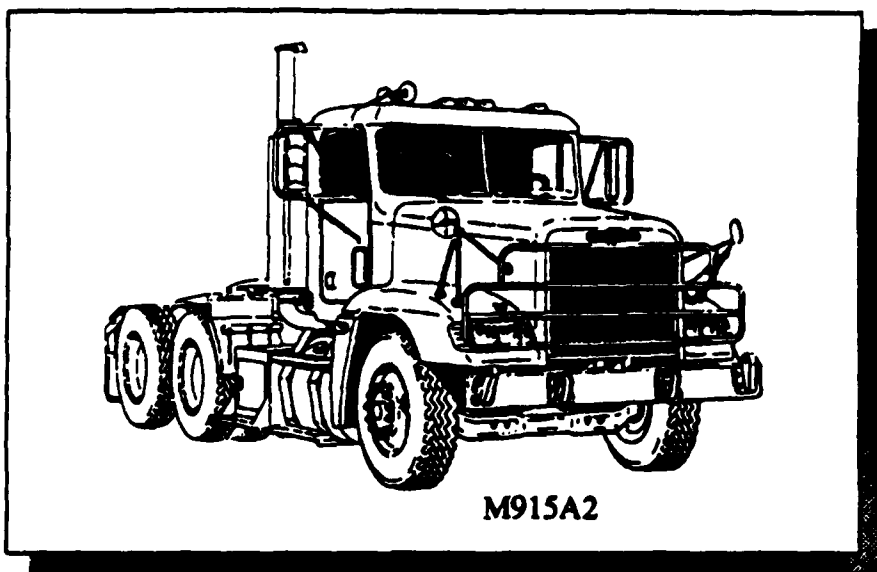
These vehicles will initially provide for artillery ammunition resupply but are capable of carrying all classes of supply. The unique capability of PLS is made possible by an integral self-load/unload design which enables the driver to load or unload the entire cargo bed from within the cab in a matter of minutes. PLS vehicles are efficient, lightweight, and can rapidly move from one mission to the next since the vehicles are not dedicated to a single load/mission.

PLS vehicles will supplement the existing fleet of dedicated, single purpose vehicles in the 8 ton through 12 ton range.

# LINE HAUL TRACTOR

(M915A2)

SSN: D159



## PRIMARY MISSIONS

- LINE HAUL
- RESUPPLY OF GENERAL BULK CARGO  
CONTAINERS AND M113 APC'S

## COMPANION SEMITRAILERS

- USED PRIMARILY WITH:
  - 34 TON M872 SERIES
  - 7500 GALLON FUEL
  - TANKER M1062

## TERRAIN

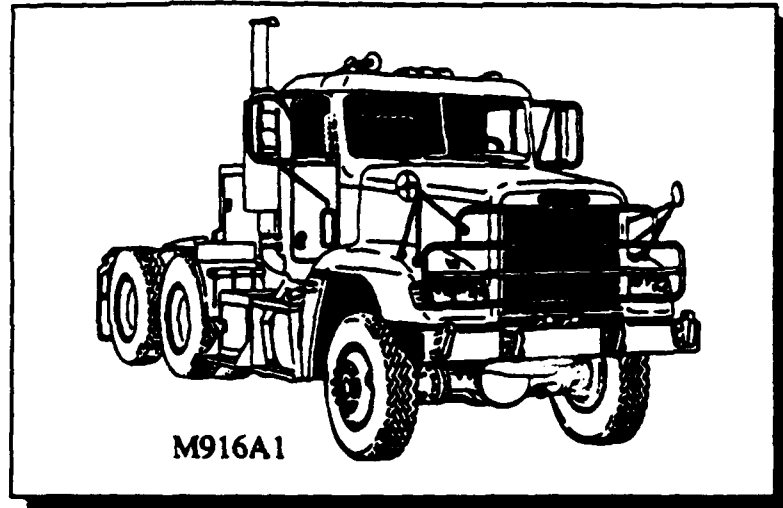
- ON-ROAD

The line haul tractor will remain a unique vehicle for the Army due to the economy of buying an essentially on-road tractor for use on main supply routes. It's characteristics are relatively typical of a heavy commercial highway transport tractor. The M915 Series tractors are the prime movers of M872 Series semitrailers in breakbulk and container transport roles. The latest change in requirements for this tractor has been an addition of the role as prime mover for the M1062 7500-gallon fuel tanker.

The M915A2 is being procured with the M916A1 (LET) on a single contract.

# ENGINEER TRACTOR

(M916A1)  
SSN: D196



## PRIMARY MISSION

- MOVEMENT OF HEAVY ENGINEER EQUIPMENT

## TERRAIN

- PRIMARILY ON-ROAD
- LIMITED OFF-ROAD

## COMPANION SEMITRAILER

- 40 TON LOW BED M870

The M916A1 truck tractor provides for the transport of heavy engineer equipment. The M916A1 is being procured with the M915A2 because there is a high degree of commonality between this engineer tractor and the line haul tractor. Combining models for a single procurement significantly reduces the logistics burden in the field.

## M916A1 TRACTOR CHARACTERISTICS

### PHYSICAL

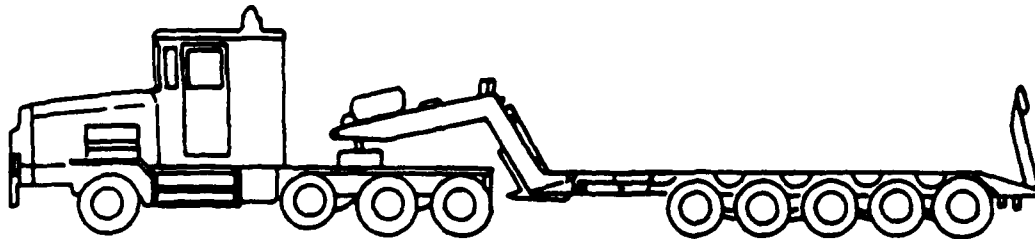
- 66,000 LB. GVWR
- 130,000 LB. GCVW
- 3-1/2 INCH KINGPIN, FULLY
- OSCILLATING FIFTH WHEEL
- 45,000 LB. HYDRAULIC WINCH
- 6X6 CONFIGURATION

### PERFORMANCE

- 20% GRADE AT GCWR
- 10% SIDE SLOPE
- 55 MPH CAPABILITY
- 11.6 INCH GROUND CLEARANCE

# NAVY EQUIPMENT TRANSPORTER FLEET

**M911 TRACTOR AND XM1070 TRACTOR- M1000 SEMITRAILER**  
**SSN: D101**



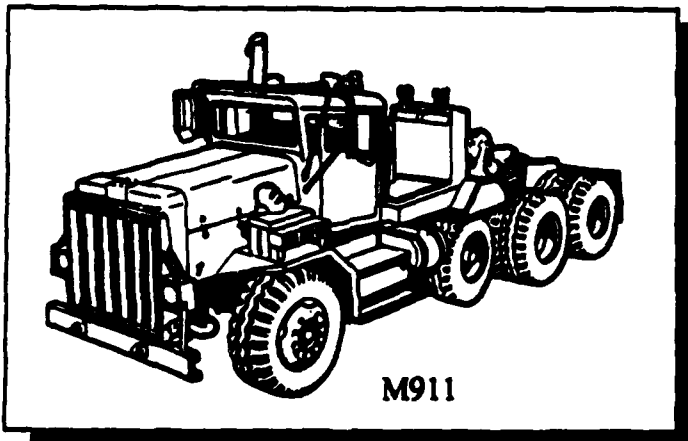
**XM1070 TRACTOR - M1000 SEMITRAILER**

## **PRIMARY MISSION**

- TRANSPORT OF COMBAT VEHICLES

## **TERRAIN**

- PRIMARILY ON-ROAD



**M911**

## **COMPANION SEMITRAILER**

- 60 TON LOW BED M747

The original Heavy Equipment Transporter (HET), the M911, was produced in the late 1970's and was designed to tow the M747 60 ton, lowboy semitrailer. At that time the hauling capacity of this pair was sufficient to meet all Army towing requirements. However, the increasing payload demands presented by the M1 and M1A1 Main Battle Tanks have resulted in the Army specifying a new 70 ton tractor/trailer combination to transport them. The new pair has been designated the Heavy Equipment Transport System (HETS), consisting of the XM1070 tractor and the M1000 semitrailer.

(Note: The drawing of the XM1070 tractor is merely a generic outline as the final design is not yet available.).

There will continue to be a field requirement for the 60 ton HET, but it is anticipated that no further procurements will be necessary.